described hereinabove, as well as variations and modifications thereof which would occur to persons skilled in the art upon reading the foregoing description and which are not disclosed in the prior art.

WE CLAIM

1. A method for printing a pattern, the method comprising:

determining an illumination scheme in response to the pattern; and

directing, in response to the determination, at least one beam of radiation having a fundamental frequency, via a medium, towards an intermediate layer such as to excite at least one third harmonic beam that propagates through at least a portion of the intermediate layer towards a radiation sensitive layer; whereas the radiation sensitive layer is sensitive to third harmonic radiation and is substantially not sensitive to radiation of the fundamental frequency.

2. The method of claim 1 wherein the step of directing comprising focusing at least one beam of radiation onto the intermediate layer.

3. The method of claim 2 wherein a focal point of a beam of fundamental frequency is substantially located at an interface defined by the medium and the intermediate layer.

4. The method of claim 1 wherein (i) the product of the sensitivity of the radiation sensitive layer to third harmonic radiation and the intensity of the third harmonic radiation is greater than a radiation sensitive layer threshold, and (ii) the product of the sensitivity of the radiation sensitive layer to fundamental radiation and the intensity of the fundamental radiation is less than the threshold.

5. The method of claim 1 wherein the beam of fundamental frequency is characterized by a short duration.

6. The method of claim 1 wherein the beam of fundamental radiation is characterized by high intensity.

7. The method of claim 1 wherein the fundamental frequency is within the ultra violet and extreme ultra violet spectral range.

8. The method of claim 1 wherein directing at least two beams of fundamental frequency simultaneously towards at least two respective locations of the intermediate layer.

9. The method of claim 1 whereas a $\chi^{(3)}$ of the medium differs from a $\chi^{(3)}$ of the intermediate layer.

10. A system for printing a pattern, the apparatus comprising:

a controller, for determining an illumination scheme in response to the pattern; and

optics, coupled to the controller, for directing, in response to the determination, at least one beam of radiation having a fundamental frequency, via a medium, towards an intermediate layer such as to excite at least one third harmonic beam that propagates through at least a portion of the intermediate layer towards a radiation sensitive layer; whereas the radiation sensitive layer is sensitive to third harmonic radiation and is substantially not sensitive to radiation of the fundamental frequency.

11. The system of claim 10 wherein the optics comprise at least one objective lens for focusing at least one beam of radiation onto the intermediate layer.

12. The system of claim 11 wherein a focal point of a beam of fundamental frequency is substantially located at an interface defined by the medium and the intermediate layer.

13. The system of claim 10 wherein (i) the product of the sensitivity of the radiation sensitive layer to third harmonic radiation and the intensity of the third harmonic radiation is greater than a radiation sensitive layer threshold, and (ii) the product of the sensitivity of the radiation sensitive layer to fundamental radiation and the intensity of the fundamental radiation is less than the threshold.

14. The system of claim 10 wherein the beam of fundamental frequency is characterized by a short duration.

15. The system of claim 10 wherein the beam of fundamental radiation is characterized by high intensity.

16. The system of claim 10 wherein the fundamental frequency is within the ultra violet and extreme ultra violet spectral range.

17. The system of claim 10 further adapted to direct at least two beams simultaneously towards at least two respective locations of the intermediate layer.

18. The system of claim 10 whereas the medium has a $\chi^{(3)}$ that differs from a $\chi^{(3)}$ of the intermediate layer.